

What is claimed is:

1           1.     A method of maintaining a seawall disposed between a body of water  
2     and retained earth, comprising the steps of  
3           forming a passage through the seawall to extend downwardly at an acute  
4     angle from a water facing side of the seawall to an earth facing side of the seawall;  
5           inserting an anchoring member through the passage from the water facing  
6     side of the seawall and into the retained earth on the earth facing side of the seawall;  
7           advancing the anchoring member into the retained earth;  
8           anchoring an anchor of the anchoring member in the retained earth at a  
9     distance spaced from the earth facing side of the seawall with a longitudinally  
10    extending shaft of the anchoring member which carries the anchor extending through  
11    the passage; and  
12           securing a retaining member on an end of the shaft extending from the  
13    passage along the water facing side of the seawall to apply compressive force  
14    against the water facing side of the seawall to resist displacement of the seawall due  
15    to pressure of the retained earth against the earth facing side thereof.

1           2.     The method of retaining a seawall as recited in claim 1 wherein said  
2     step of forming includes drilling through the thickness of the seawall using a machine  
3     deployed on the body of water.

1           3.     The method of maintaining a seawall as recited in claim 1 wherein said  
2     step of advancing includes moving the shaft longitudinally into the retained earth.

1           4.     The method of maintaining a seawall as recited in claim 3 wherein said  
2     step of advancing includes rotating the shaft into the retained earth.

1           5.     The method of maintaining a seawall as recited in claim 1 wherein said  
2     step of anchoring includes embedding a helical formation of the anchor in the  
3     retained earth to resist withdrawal of the anchoring member from the retained earth.

1           6.     The method of maintaining a seawall as recited in claim 1 wherein said  
2     step of advancing includes advancing the anchoring member into the retained earth  
3     with the anchor in a collapsed position and said step of anchoring includes moving  
4     the anchor to an expanded position resisting withdrawal of the anchoring member  
5     from the retained earth.

1           7.     The method of maintaining a seawall as recited in claim 1 wherein said  
2     step of securing includes securing the retaining member on the shaft with the  
3     retaining member disposed between the water facing side of the seawall and a  
4     securing member threadedly engaged on the shaft to apply compressive force  
5     against the retaining member.

1           8.     The method of maintaining a seawall as recited in claim 1 wherein said  
2     step of securing includes tensioning the anchoring member between the anchor and  
3     the retaining member.

4           9.     The method of maintaining a seawall as recited in claim 1 and further  
5 including the step of introducing a filler into the passage around the shaft.

1           10.    The method of maintaining a seawall as recited in claim 1 wherein said  
2 step of securing includes inserting an insert between the retaining member and the  
3 water facing side of the seawall and securing the retaining member on the end of the  
4 shaft with the insert interposed between the retaining member and the water facing  
5 side of the seawall to apply compressive force from the retaining member against the  
6 water facing side of the seawall.

1           11.    The method of maintaining a seawall as recited in claim 1 and further  
2 comprising, subsequent to said securing step, the step of periodically inspecting the  
3 seawall and periodically adjusting the retaining member to adjust the compressive  
4 force applied by the retaining member against the seawall.

1           12.    A method of maintaining a seawall disposed between a body of water  
2 and retained earth, comprising the steps of  
3           installing a first anchoring member to extend through the seawall from a water  
4 facing side to an earth facing side of the seawall at a first location;  
5           installing a second anchoring member to extend through the seawall from the  
6 water facing side to the earth facing side at a second location spaced from the first  
7 location; and

8 rigidly interconnecting the ends of the first and second anchoring members to  
9 maintain the separation distance between the first and second anchoring members.

1 13. The method of maintaining a seawall as recited in claim 12 wherein  
2 said step of installing a first anchoring member comprises anchoring an anchor of the  
3 first anchoring member in the retained earth at a distance spaced from the earth  
4 facing side of the seawall with an end of the first anchoring member extending from  
5 a water facing side of the seawall and securing a first retaining member on the end of  
6 the first anchoring member, said step of installing a second anchoring member  
7 comprises anchoring an anchor of the second anchoring member in the retained  
8 earth at a distance spaced from the earth facing side of the seawall with an end of  
9 the second anchoring member extending from the water facing side of the seawall  
10 and securing a second retaining member on the end of the second anchoring  
11 member, and said step of rigidly interconnecting comprises rigidly interconnecting the  
12 first and second retaining members.

1 14. The method of maintaining a seawall as recited in claim 13 wherein  
2 said step of securing a first retaining member includes compressing the seawall and  
3 the retained earth between the first retaining member and the anchor of the first  
4 anchoring member and said step of securing a second retaining member includes  
5 compressing the seawall and the retained earth between the second retaining  
6 member and the anchor of the second anchoring member.

1           15.    The method of maintaining a seawall as recited in claim 13 wherein  
2   said step of rigidly interconnecting includes connecting a first end of a connecting  
3   member to the first retaining member and connecting a second end of the  
4   connecting member to the second retaining member with the connecting member  
5   having a fixed length between the first and second retaining members.

1           16.    The method of maintaining a seawall as recited in claim 13 wherein  
2   said step of rigidly interconnecting includes connecting a first end of a connecting  
3   member to the first retaining member and connecting a second end of the  
4   connecting member to the second retaining member with the connecting member  
5   having an adjustable length between the first and second retaining members.

1           17.    The method of maintaining a seawall as recited in claim 12 wherein  
2   said step of installing a first anchoring member includes installing the first anchoring  
3   member on one side of an opening in the seawall, said step of installing a second  
4   anchoring member includes installing the second anchoring member on an opposite  
5   side of the opening, and said step of rigidly interconnecting includes drawing the first  
6   and second anchoring members toward one another to reduce the size of the  
7   opening and maintaining the separation distance between the first and second  
8   anchoring members when the opening is reduced in size.

1           18.    The method of maintaining a seawall as recited in claim 12 and further  
2   including the steps of installing a third anchoring member to extend through the

3 seawall from the water facing side to the earth facing side of the seawall at a third  
4 location spaced from the first and second locations and rigidly interconnecting the  
5 third anchoring member to at least one of the first and second anchoring members to  
6 maintain the separation distance between the third anchoring member and the at  
7 least one of the first and second anchoring members.

1 19. The method of maintaining a seawall as recited in claim 17 and further  
2 including, subsequent to said step of rigidly interconnecting, the steps of periodically  
3 inspecting the seawall, periodically further drawing the first and second anchoring  
4 members toward one another to further reduce the size of the opening, and  
5 maintaining the separation distance between the first and second anchoring  
6 members each time the opening is further reduced in size.

1 20. The method of maintaining a seawall as recited in claim 17 wherein  
said step of drawing includes closing the opening.

1 21. Apparatus for maintaining a seawall disposed between a body of water  
2 and retained earth, comprising  
3 a first anchoring device comprising a first anchoring member and a first  
4 retaining member, said first anchoring member comprising a longitudinally extending  
5 shaft, an anchor carried by said shaft for being anchored in the retained earth at a  
6 distance spaced from an earth facing side of the seawall with an end of said shaft  
7 extending from a water facing side of the seawall at a first location, said first retaining

8 member being securable on said end of said shaft at a selected location along the  
9 length of said shaft;

10 a second anchoring device comprising a second anchoring member and a  
11 second retaining member, said second anchoring member comprising a  
12 longitudinally extending shaft, an anchor carried by said shaft of said second  
13 anchoring member for being anchored in the retained earth at a distance spaced  
14 from the earth facing side of the seawall with an end of said shaft of said second  
15 anchoring member extending from the water facing side of the seawall at a second  
16 location, spaced from the first location, said second retaining member being  
17 securable on said end of said shaft of said second anchoring member at a selected  
18 location along the length of said shaft of said second anchoring member; and

19 a connecting member securable to said first and second retaining members to  
20 maintain the separation distance between said first and second anchoring members.

1 22. The apparatus for maintaining a seawall as recited in claim 21 wherein  
2 said first anchoring device comprises a first securing member threadedly securable  
3 on said end of said shaft of said first anchoring with said first retaining member  
4 disposed on said shaft of said first anchoring member between said first securing  
5 member and the water facing side of the seawall, and said second anchoring device  
6 comprises a second securing member threadedly securable on said end of said shaft  
7 of said second anchoring member with said second retaining member disposed on  
8 said shaft of said second anchoring member between said second securing member  
9 and the water facing side of the seawall.

10           23.    The apparatus for maintaining a seawall as recited in claim 21 wherein  
11   said connecting member includes a first end securable to said first retaining member,  
12   a second end securable to said second retaining member, and a fixed length  
13   between said first and second retaining members.

1           24.    The apparatus for maintaining a seawall as recited in claim 21 wherein  
2   said connecting member includes a first end securable to said first retaining member,  
3   a second end securable to said second retaining member, and an adjustable length  
4   between said first and second retaining members for selectively adjusting the  
5   separation distance to be maintained between said first and second anchoring  
6   members.

1           25.    The apparatus for maintaining a seawall as recited in claim 24 wherein  
2   said connecting member comprises a turnbuckle.

1           26.    The apparatus for maintaining a seawall as recited in claim 21 wherein  
2   at least one of said first and second anchoring devices further comprises a sleeve for  
3   receiving said shaft of said at least one of said first and second anchoring members  
4   therethrough and for extension through the seawall with an interference fit.

1           27.    The apparatus for maintaining a seawall as recited in claim 21 wherein  
2   at least one of said first and second anchoring devices further comprises an insert



3 for being interposed between said retaining member of said at least one of said first  
4 and second anchoring devices and the water facing side of the seawall.

1 28. The apparatus for maintaining a seawall as recited in claim 21 wherein  
2 said anchors of said first and second anchoring members comprise helical  
3 formations, respectively.

1 29. The apparatus for maintaining a seawall as recited in claim 21 wherein  
2 said anchors of said first and second anchoring members are each movable between  
3 a collapsed position and an expanded position in which said anchors are anchored in  
4 the retained earth.